

WE CLAIM:

1. A NO_x removal composition suitable for reducing NO_x emissions during catalyst regeneration in a fluid catalytic cracking process, said composition comprising (i) an acidic oxide support, (ii) cerium oxide, (iii) at least one oxide of a lanthanide series element other than cerium oxide, and (iv), optionally, at least one oxide of a transition metal selected from Groups Ib and IIB of the Periodic Table and mixtures thereof.
- 10 2. The composition of claim 1 wherein said acidic oxide support is selected from the group consisting of alumina and silica-alumina.
- 15 3. The composition of claim 2 said acidic oxide support is alumina.
4. The composition of claim 2 wherein said acidic oxide support is silica-alumina.
- 20 5. The composition of claim 4 wherein said silica alumina has an alumina:silica mole ratio of from about 1:1 up to about 50:1.
6. The composition of claim 4 wherein the said silica-alumina is prepared by caustic leaching of silica from calcined kaolin.
- 25 7. The composition of claim 4 wherein the said silica-alumina is prepared by the caustic leaching of silica from kaolin calcined through its characteristic exotherm.
- 30 8. The composition of claim 7 where the caustic leached kaolin support is a microsphere whereby the caustic leached kaolin is bound with aluminum chlorohydroxide before calcination through its characteristic exotherm.

9. The composition of claim 1 wherein said Group Ib and IIb transition metals are selected from the group consisting of copper, silver, zinc and mixtures thereof.

5 10. The composition of claim 1 wherein said cerium oxide is present in amounts of from at least about 0.5 part by weight per 100 parts by weight of said acidic oxide support.

10 11. The composition of claim 1 wherein said at least one oxide of a lanthanide series element other than cerium oxide is present in amounts of at least about 0.5 part by weight per 100 parts by weight of said acidic oxide support.

15 12. The composition of claim 1 wherein said cerium oxide is present in amounts of from at least about 2 up to about 25 parts by weight per 100 parts by weight of said acidic oxide support.

20 13. The composition of claim 1 wherein said at least one oxide of a lanthanide series element other than cerium oxide is present in amounts of from at least about 2 up to about 25 parts by weight per 100 parts by weight of said acidic oxide support.

25 14. The composition of claim 1 wherein said oxide of a lanthanide series element other than cerium oxide praseodymium oxide.

15. The composition of claim 14 wherein the amount of ceria to praseodymium oxide ranges from about 1:4 to about 4:1 by weight.

30 16. The composition of claim 14 wherein the amount of ceria to praseodymium oxide ranges from about 1:2 to about 2:1 by weight.

17. A fluid cracking catalyst composition comprising (a) a cracking component suitable for catalyzing the cracking of hydrocarbons,

and (b) a NO_x reduction composition comprising (i) an acidic oxide support (ii) cerium oxide, (iii) at least one oxide of a lanthanide series element other than ceria, and (iv), optionally, an oxide of a transition metal selected from Groups Ib and IIB of the Periodic Table, said NO_x reduction composition being an integral component of the catalyst composition particles, being separate particles from the catalyst component or mixtures thereof and being present in the cracking catalyst in a sufficient NO_x reducing amount.

10 18. The cracking catalyst of claim 17 wherein said cracking catalyst comprises an admixture of component (a) and component (b).

15 19. The cracking catalyst of claim 17 wherein said cracking catalyst comprises integral particles which contain both components (a) and component (b).

20 20. The cracking catalyst of claim 17 wherein the NO_x reduction composition (b) comprises about 0.1 to 15 wt % of the cracking catalyst composition.

20 21. The cracking catalyst of claim 17 wherein said oxide of a lanthanide series element other than ceria is praseodymium oxide.

25 22. A method of reducing NO_x emission during fluid catalytic cracking of a hydrocarbon feedstock into lower molecular weight components said method comprising contacting a hydrocarbon feedstock with a cracking catalyst suitable for catalyzing the cracking of hydrocarbons at elevated temperature whereby lower molecular weight hydrocarbon components are formed in the presence of a NO_x reduction composition, wherein said NO_x reduction composition comprises (i) an acidic oxide support, (ii) at least 0.5 part by weight of cerium oxide per 100 parts by weight of acidic oxide support, (iii). at least one 0.5 part by weight of at least one oxide of a lanthanide series element other than ceria per

100 parts by weight of acidic oxide support and (iv), optionally, an oxide of a transition metal selected from Groups Ib and IIB of the Periodic Table, said NO_x reduction component being present in a sufficient NO_x reducing amount.

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23. The method of claim 22 wherein said cracking catalyst and NO_x reduction composition comprises an admixture of separate the cracking catalyst component and the NO_x reduction composition component.

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24. The method of claim 22 wherein said cracking catalyst and NO_x reduction composition comprises an integral combination of the cracking catalyst component and the NO_x reduction composition component.

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25. The method of claim 22 wherein said cracking catalyst is fluidized during contact with a hydrocarbon feedstock.

26. The method of claim 25 further comprising recovering used cracking catalyst from said contacting step and treating said used catalyst under conditions to regenerate said catalyst.

27. The method of claim 22 wherein said hydrocarbon feedstock contains at least 0.1 wt % nitrogen.

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28. The method of claim 22 wherein said at least oxide of a lanthanide series element other than ceria is praseodymium oxide.

29. The method of claim 28 wherein the amount of cerium oxide to praseodymium oxide, ranges from about 4:1 to about 1:4 by weight.